

RESEARCH DEPARTMENT

THE SERVICE AREA OF THE SANDALE TELEVISION TRANSMITTER

Report No. K-145

(1960/12)

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Section	Title	Page
	SUMMARY	1
1	INTRODUCTION	1
2	GENERAL	1
3	RESULTS	1
4	CONCLUSIONS	4
5	REFERENCES	4
	APPENDIX	5

April 1960

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SUMMARY

This report gives the results of a field strength survey of the Sandale television transmitter. It is shown that the service area conforms well with that predicted from site test measurements, although there are some small towns in which the field strength is considerably less than the value predicted.

1. INTRODUCTION

The Sandale television transmitter, situated approximately 13 miles (21 km) south-west of Carlisle, serves the Solway Firth area. A temporary service started on 5th November 1956 with a maximum effective radiated power (e.r.p.) of 0.5 kW radiated by a temporary aerial 95 ft (29 m) above ground level. The full service started on 9th December 1957.

2. GENERAL

The Sandale television service operates on Channel 4 (vision 61.75 Mc/s; sound 58.25 Mc/s). A 5 kW vision transmitter drives a horizontally polarized eight-tier unipole-V aerial mounted 415 ft (127 m) above ground level. The horizontal radiation pattern (h.r.p.) of the aerial is shown in Fig. 1; the mean e.r.p. is 15 kW. The site height is 1192 ft (364 m) above mean sea level.

3. RESULTS

The results of the survey are presented in a field strength contour map, Fig. 2, while details of the field strength in the towns surveyed with populations of 1,000 or more are given in the Appendix.

The area covered by the individual contours shown in Fig. 2 is substantially the same as predicted¹ but the field strength in certain small towns is less than expected. Detailed comparison between the site test measurements, which were made on a vertically polarized transmission, and those of both the temporary² and final condition surveys, with horizontal polarization, indicates that polarization under certain topographical conditions plays a larger part in determining the field strength than earlier observations indicated. From the data referred to it is not possible, however, to arrive at any definite conclusions — a controlled experiment would be necessary to establish the detailed effects polarization plays in determining field strength.

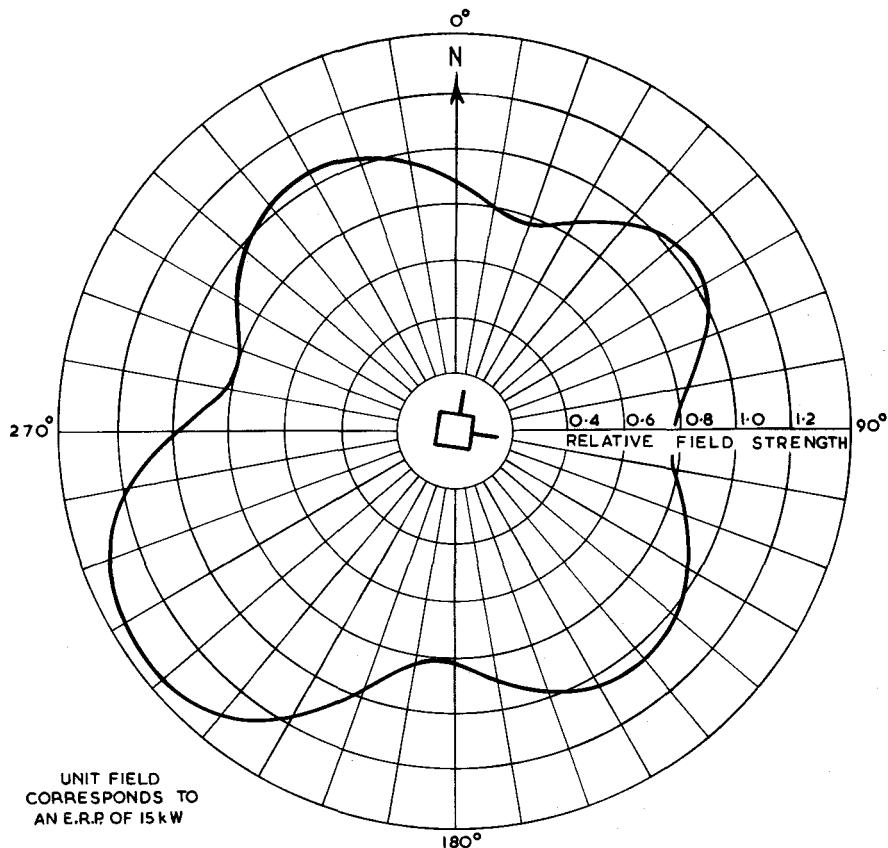


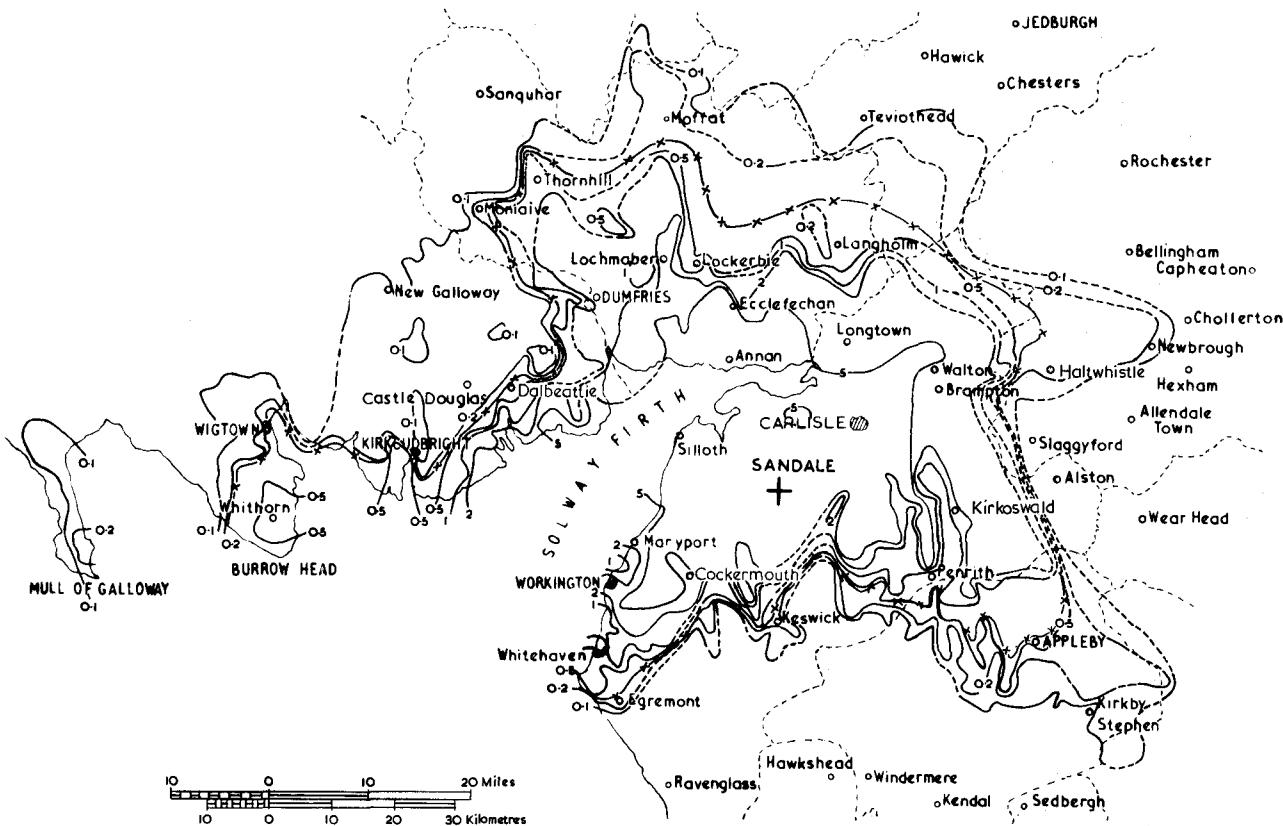
Fig. 1 - H.R.P. of Sandale television transmitter

The net result, as far as Sandale is concerned, is that the median field strength in some small towns is considerably less than expected, although in the large towns there is very good agreement between the expected and realised values. Referring to the detailed results in the Appendix, it will be seen that the large centres of population, viz., Annan, Carlisle, Cockermouth, Dumfries, Maryport, Penrith, Whitehaven and Workington, are all reasonably well served, the lowest median field strength being 0.56 mV/m at Whitehaven. The towns with the poorest service are Castle Douglas (0.17 mV/m) and the county town of Kirkcudbright (0.08 mV/m). In neither town is the field strength strong enough for a satisfactory service and both are subject to co-channel interference for more than 10% of the time.

In addition to serving the Solway Firth area, Sandale serves the northern half of the Isle of Man, all of which, including Ramsey, receives a field strength greater than 0.5 mV/m.

The population within the 0.1 mV/m, 0.5 mV/m and 5.0 mV/m contours has been evaluated by Engineering Information Department, with the following results:

Field strength in mV/m at 30 ft (9.1 m) a.g.l.	England	Scotland	Isle of Man	Total
0.1	269,300	110,700	10,800	390,800
0.5	249,100	71,400	9,500	330,000
5.0	116,100	11,400	600	128,100



Note:

The contours represent field strength in mV/m at 30ft (9.1m) above ground exceeded at 50% of receiving sites in a given locality. The value exceeded at 90% of receiving sites may be as much as 10dB below the value indicated by the contours particularly in hilly and built-up areas.

— x — Limit of service area free from perceptible co-channel interference for 90% of the time. The protection ratio on which the estimates are based is 30dB with a reduction of 10dB for crossed-polarization.

Population within :-

mV/m	England	Scotland	I.O.M.	Total
0.1	269,300	110,700	10,800	390,800
0.5	249,100	71,400	9,500	330,000
1.0	116,100	11,400	600	128,100

SANDALE

CHANNEL 4 (61.75 Mc/s)

MEASURED

SITE HEIGHT: 1192ft (364m) AMSL

AERIAL HEIGHT: 415ft (127m) AGL

E.R.P.:

9.6—28kW

POLARIZATION: HORIZONTAL

AERIAL: EIGHT-TIER UNIPOLE-V

Fig. 2

4. CONCLUSIONS

The service area of the Sandale television transmitter conforms well with that predicted.¹ There are, however, small areas including small towns in which the field strength is considerably less than the value predicted. The data available from the site test and the temporary and final conditions at Sandale indicate that the differences are related to the differing polarizations of the site test and the final transmission.

5. REFERENCES

1. "Television Transmitters — Site Tests in Cumberland", Research Department Report No. K-108, Serial No. 1956/8.
2. "The Service Area of the Temporary Television Transmitter at Sandale", Research Department Report No. K-124, Serial No. 1957/9.

APPENDIX

Field strength in mV/m at 30 ft (9.1 m) A.G.L.

E.R.P. = 9.6-28 kW

Town	Field strength exceeded at stated percentage locations			Town	Field strength exceeded at stated percentage locations		
	10%	50%	90%		10%	50%	90%
Alston	0.14	0.1	0.06	Keswick	0.89	0.38	0.14
Ambleside	<0.05	-	-	Kirkby Stephen	0.13	0.08	0.06
Annan	13	7.1	3.4	Kirkconnel	0.2	0.15	0.11
Appleby	1.6	0.67	0.19	Kirkcudbright	0.13	0.08	0.06
Aspatria	67	34	8.4	Kirkinner	0.25	0.19	0.1
Brampton	8.9	3.8	1.6	Kirkmaiden	0.45	0.3	0.2
Carlisle	13	7.1	4.5	Langholm	0.94	0.34	0.15
Castle Douglas	0.35	0.17	0.08	Lochmaben	3.8	2.1	1.1
Cleator Moor	0.81	0.35	0.21	Lockerbie	1.1	0.71	0.4
Cockermouth	15	4.5	1.5	Maryport	6.7	3.0	1.3
Crawford	0.09	0.08	0.06	New Cumnock	0.09	0.07	-
Crossmichael	0.22	0.14	0.09	Penrith	3.0	1.0	0.38
Dalbeattie	0.63	0.3	0.18	St. Bees	0.79	0.21	0.07
Dalston	27	17	10	Sanquhar	0.37	0.3	0.2
Dearham	20	16	6.3	Seascale	0.17	0.12	0.07
Dumfries	2.8	1.7	0.79	Shap	0.16	0.1	0.06
Egremont	0.42	0.21	0.12	Silloth	19	13	8.4
Flimby	2.4	1.7	0.79	Stamfordham	0.13	0.11	0.08
Frizington	0.79	0.5	0.33	Warwick (Cumberland)	10	5.6	3.4
Great Clifton	16	3.8	1.1	Whitehaven	3.2	0.56	0.15
Gretna	11	8.4	5.0	Whithorn	1.2	0.53	0.27
Haltwhistle	0.4	0.2	0.13	Wigton	99	50	25
Haydon Bridge	0.09	0.07	-	Wigtown	0.6	0.33	0.17
				Workington	6.7	3.3	1.6